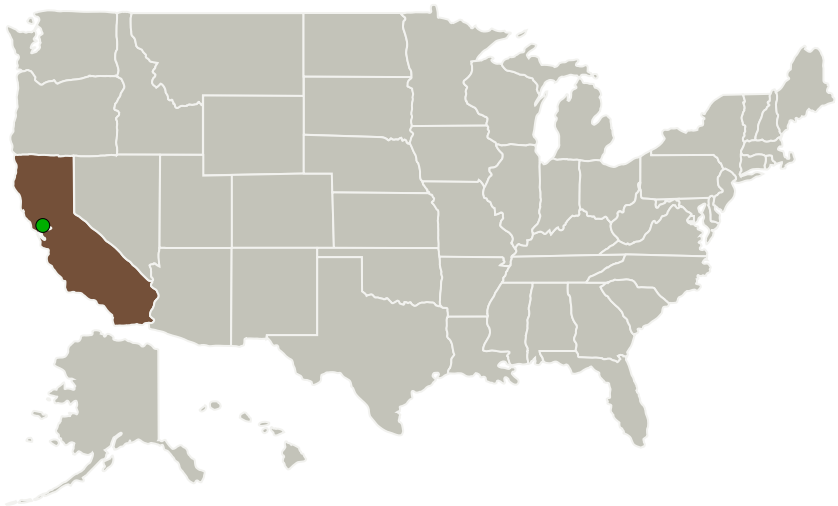
Practical Non-contact ECG Electrodes for Prep-free Monitoring, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

Cognionics has developed a high-quality, low-noise, dry/non-contact ECG electrode that can obtain signals even through layers of clothing without any skin preparation. Although the idea of a non-contact electrode is not new and has been previously investigated by other research groups, a successful design has yet to be achieved due to unresolved issues relating to noise, artifacts and complexity. The Cognionics technology is based in part on a novel custom integrated amplifier developed by the PI and licensed from the University of California, San Diego. The patent-pending amplifier is specifically optimized for high-impedance biopotential sensing and is able to achieve significantly better performance in terms of input impedance and noise than the discrete off-the-shelf components used in previous research efforts. In contrast to older designs, the Cognionics sensor requires no manual adjustments (neutralization), consumes a minimum of power (a few uWs) and is virtually insensitive to variations in the body-electrode coupling strength. The new amplifier combined with several Cognionics developed proprietary techniques has already yielded a non-contact sensor with significant improvements in signal quality even on fully ambulatory subjects. The Phase I proposal will further develop the sensor to demonstrate full compliance with AAMI ECG specifications through both bench and live testing. In Phase I, a single lead non-contact chest strap will be produced to serve as an evaluation platform for delivery to NASA. A successful Phase I project will demonstrate that the core Cognionics non-contact sensor can fully meet NASA's signal quality requirements. The Phase II project will develop a full diagnostic ECG device for use in space environments and integrate the sensor within existing and future NASA systems (e.g., spacesuits).

Primary U.S. Work Locations and Key Partners



Practical Non-contact ECG Electrodes for Prep-free Monitoring, Phase I

Table of Contents

Practical Non-contact ECG Electrodes for Prep-free Monitoring, Phase I

Completed Technology Project (2012 - 2012)

Organizations Performing Work	Role	Type	Location
Cognionics	Lead Organization	Industry	San Diego, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138420)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Cognionics

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

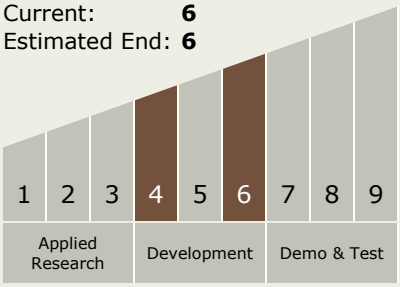
Carlos Torrez

Principal Investigator:

Yu Chi

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Practical Non-contact ECG Electrodes for Prep-free Monitoring, Phase I

Completed Technology Project (2012 - 2012)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.1 Medical Diagnosis and Prognosis

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System